AMENDMENTS

IN THE CLAIMS:

1. (Currently Amended) A method for mapping an interior surface of a subterranean void, comprising the steps of:

inserting an autonomous void mapping robot at least partially into an interior portion of the subterranean void;

capturing local range data describing the interior surface of the subterranean void at a position proximate to said void mapping robot;

incorporating said captured local range data into a full data map of the interior surface of said subterranean void;

moving said void mapping robot to a second local position within the subterranean void, the route to said second position calculated by the autonomous void mapping robot based on an analysis of the full map data including the captured local range data;

capturing second local range data describing the interior surface of the subterranean void at a position proximate to said void mapping robot; and

incorporating said captured second local range data into the full data map.

2. (Original) The method of Claim 1, wherein said inserting step is comprised of the steps of stowing the void mapping robot before insertion, moving the void mapping robot into the interior portion of the subterranean void, and deploying the void mapping robot within the subterranean void.

3. (Original) The method of Claim 2, wherein said stowing is accomplished by deflating part of the void mapping robot, and said deploying is accomplished by inflating part of the void mapping robot.

4. (Original) The method of Claim 2, wherein said stowing is accomplished by folding at least part of the void mapping robot into an interior portion of the void mapping robot, and said deploying is accomplished by unfolding at least part of the void mapping robot out of the interior portion of the void mapping robot.

5. (Original) The method of Claim 1, wherein, at insertion, the void mapping robot includes a mobile mapping robot docked to a docking station.

6. (Original) The method of Claim 1, wherein said captured local range data is two dimensional and said full data map is three dimensional.

7. (Original) The method of Claim 1, further comprising the step of:

continuously acquiring, during said moving step, additional low resolution scans that are used to confirm that the robot is moving according to the calculated second position.

8. (Original) The method of Claim 7, wherein the route to said second position is constrained to follow route guidelines selected from the group consisting of a perimeter-finding algorithm, a route-following algorithm and a corridor traverse algorithm.

9. (Original) The method of Claim 1, wherein said movement and calculation is performed autonomously by the void mapping robot.

10. (Original) The method of Claim 1, wherein said movement is accomplished by removal through a first borehole and insertion in a second borehole.

11. (Original) The method of Claim 1, further comprising the step of:

egressing from the void.

12. (Original) The method of Claim 11, further comprising the step of:

after egressing, post processing the full map data into an additional map of the void in greater resolution than the full map data.

13. (Original) The method of Claim 11, further comprising the steps of:

capturing additional sensor data not related to the internal surface of the void; and

after egressing, post processing the full map data and the additional sensor data into a void map with additional data.

14. (Currently Amended) A method for mapping interior surfaces of a void, comprising the steps of:

storing existing data about the interior surfaces of the void;

ingressing an autonomous void mapping robot into said void;

determining a mode of exploration based on said existing data;

determining an initial mobility plan based on said existing data and said mode of exploration;

modeling at least a local area of said interior surfaces of the void proximate the void mapping robot using two dimensional range finding scans;

utilizing additional sensors to gather environmental information about the interior of the void not related to navigation;

autonomously updating said mobility plan on board the void mapping robot based on the model of said local area; and

egressing the void mapping robot out of said void.

15. (Original) A robot for mapping the internal surface of a void, comprising:

means for moving the robot within the void; ~~and~~

range data collection means for collecting local mapping data about the void by determining the distance from a point in the internal surface of the void to the robot;

means for incorporating said local mapping data into an overall void map on board said robot; and

means on board said robot for utilizing~~, wherein~~ said local mapping data ~~is used~~ to calculate movement of the robot through the void by the means for moving the robot~~and said local mapping data is integrated into an overall void map~~.

16. (Original) The void mapping robot of Claim 15, wherein said mobility means includes swim fins and a propeller.

17. (Original) The void mapping robot of Claim 15, wherein said mobility means includes tires.

18. (Original) The void mapping robot of Claim 15, wherein said range data collection means includes a sonar sensor for use in liquid-filled voids.

19. (Original) The void mapping robot of Claim 15, wherein said range data collection means includes a laser range finder.

20. (Currently Amended) The void mapping robot of Claim 15, further comprising:

means for sweeping said range data collection means in multiple axes to collect a volume~~plane~~ of local mapping data.

21. (NEW) The method of Claim 1, further comprising the steps of:

autonomously generating a topological map of said void space; and

autonomously navigating the void based on said topological map.